

**GUEST EDITORIAL**

**INSURANCE ANALYTICS**

BY P. EMBRECHTS

At the recent General Assembly of the Swiss Actuarial Association in Brunnen, Switzerland, I showed several of my colleagues the credit card type definition of 'The Actuarial Profession' issued jointly by the Faculty and the Institute. Overall, I agree with the wording: "Actuaries are respected professionals whose innovative approach to making business successful is matched by a responsibility to the public interest. Actuaries identify solutions to financial problems. They manage assets and liabilities by analysing past events, assessing the present risks involved and modelling what could happen in the future." This will definitely facilitate life for Swiss actuaries in a country where the name 'Aktuar' is still a synonym for 'Schriftführer eines Vereins', like the secretary of the local darts club. No doubt, discussions will arise over the front-side running definition: 'making financial sense of the future', and the absence of the explicit use of the term 'insurance' in the detailed back-side one. The latter is perhaps a pity, as recent events on world wide (stock) markets have shown. Several, through 'fusionitis' and 'megamergermania' grown all-finance (or bank-assurance) concerns are cutting sails, and declare to the public that again small is beautiful and that insurance concerns should return to their core business, which is insurance. Stock market rallies are not always around to cache too high combined ratios or pay for opportunistic guarantees. No doubt, current events, including also the accounting scandals, will have an input on our profession. It is my hope, and indeed firm belief, that actuaries who are true to their prudent methodologies will come out the better.

This brings me to the title of my Editorial: 'Insurance Analytics'. This terminology was coined by Till Guldemann, one of the spiritual fathers of the value-at-risk (VaR) concept, after I gave a talk with the title, 'Actuarial versus Financial Pricing of Insurance', on the occasion of a Risk Management in Insurance Firms workshop at the Wharton School on 16 May 1996. In this talk, I tried to convince risk managers from the banking world that there is a lot to be learned from standard actuarial methodology. Since that meeting, I have become more and more convinced of this fact, and have developed a course under the same title as part of our Master of Advanced Studies in Finance programme at the Swiss Federal Institute of Technology (ETH) and the University of Zurich (see [www.msfinance.ethz.ch](http://www.msfinance.ethz.ch)). Before I dwell a bit more upon what is behind the name 'Insurance Analytics', I first would like to say that I was pleased to see that David Wilkie,

in his recent Guest Editorial (*B.A.J.* 7, 173-176), also touched upon this potential transfer of knowledge from the actuarial to the banking world. For too long, it seems that the intellectual flow has been going solely in the other direction! The latter was very much present in the risk management era around Basel I and VaR.

We have all seen, in some form or other, the provocative statement: “Any life insurance policy equals a package of options.” Whereas this may be true from a mathematical mapping point of view, I would be very cautious hence to conclude: “We therefore can price and hedge this policy with standard tools from finance.” Before one embarks on the latter, it would be wise to have a much more careful look at the conditions under which these ‘standard tools’ were developed. One then quickly runs into issues of incompleteness, a point also raised by David Wilkie. Incompleteness concerns an area of mathematical finance where the appropriate tools lay in actuaries’ drawers for many years. It is no coincidence that one of the standard pricing and hedging approaches to credit risk is referred to as the actuarial method. Similarly, one could overnaïvely claim that any reinsurance contract is ‘just’ a combination of standard options, albeit written on an insurance loss index rather than on a financial one. An interesting development concerns the new kid on the risk management block, operational risk. This is: “the risk of loss resulting from inadequate or failed internal processes, people and systems or from external events” (Basel II). All the operational loss data I have seen are very much like non-life insurance loss data of the large-claim kind. Hence, methods from standard courses on insurance risk theory, like total claim estimation, Euler-Panjer recursion, ruin, reserving, extreme value theory, IBNR and related techniques ought to be relevant. Similar to the catastrophe insurance industry, banks are (admittedly very cautiously) discussing the possibilities of data pooling for certain operational risk types in order to get out overall loss curves, and then calibrate these on their own loss data; indeed a *déjà-vu* situation for most actuaries. All this is conditional on the fact that regulators indeed want to press ahead with a detailed quantitative analysis of such losses. I personally have serious reservations against such a development. On the more technical mathematical side of market risk modelling, many of the recent models that move away from Brownian motion add Poisson jump components, look at Lévy processes (pure jump processes) and, for actuaries well known, use doubly stochastic Poisson processes. The latter typically run in business (also called operational) time. Changing the clock as a function of market intensity was already put into the actuaries’ toolkit in the 1930s by Harald Cramér. No doubt, credibility models will find their way (under that name?) into the financial risk manager’s vocabulary. In a recent talk I attended, the speaker (with a more finance related background) informed his audience of a patent he was taking out on a new way for pricing general derivatives in essentially incomplete markets. The products covered included real options, insurance and energy

derivatives. Actuaries attending the talk brought to the speaker's attention that his approach, in part, was very much akin to actuarial pricing based on operational time and credibility. A final, important example concerns the blind belief within the banking industry that quantile based (i.e. VaR type) risk measures are the Holy Grail of quantitative risk management. Every actuary knows that the residual risk beyond that quantile is the amount that matters (ask any reinsurer), and also that normal based models mask (through their unrealistically thin tails) that important point. Actuaries have looked for some time now at risk measures suitable for multi-periods, long horizon and adequate for long-tailed loss distributions. A huge actuarial literature is available.

I could have added numerous other examples. The point I want to make is that current developments in financial and insurance regulation will no doubt intensify the exchange of ideas between actuaries and finance experts. If this is done on an equal intellectual footing, then both sides, and the financial system as a whole, will benefit. This intellectual equality one cannot achieve by decree. It has to be earned and fought for.

This leads me to a key question which one often (if not explicitly, then implicitly) hears throughout the media: "Where were you actuaries during the bull period? Why didn't you warn us more forcefully?" And it is not just the problems currently prevalent in the banking and accounting world. World-wide, and for some time now, life insurance companies, for instance, have suffered and many are still suffering. The bank-assurance concept seems to have ground to a halt. Where was our 'responsibility to the public interest', or our 'innovative approach to making business successful'? At least in Switzerland, but no doubt in many more countries, we have to ask ourselves seriously why things got so much out of hand. In a bullish market (like the one experienced towards the end of the 1990s) it is very hard indeed to forcefully heed a warning. The 'do not spoil the fun' syndrome is one actuaries will have to learn to struggle with much more in the future. Besides our bag of actuarial techniques, we will need to learn much more the language of accounting and corporate finance. Beyond that knowledge, we also need to improve our company internal and external communication as well as our communication courage. As I explained above, actuaries will also be able to give back to these other areas of expertise some of our more prudent ways of thinking. Insurance analytics may become one (small) component helpful on the road to a more secure financial (including insurance) system.

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